

Irreversibility lines of the heavy fermion spin glass URh₂Ge₂ *

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We present a study of the field dependence of the frozen-in state in the heavy fermion spin glass URh₂Ge₂. From field-cooled/zero-field-cooled magnetization along the a and c axes of the tetragonal unit cell we determine the crossover temperatures associated with the occurrence of weak and strong irreversibilities in the magnetic behavior. In low fields spin glass freezing occurs at $T_f = 9.3\text{K}$. In higher fields we observe two characteristic temperatures: the upper one, T_f , indicates the onset of spin freezing, while the lower one, T_{irr} , reflects increased irreversibility of the frozen-in state. We construct the $B - T_{f,irr}$ phase diagram, which reveals anisotropy of the freezing process for fields applied along a and c axes, respectively. T_{irr} is associated with the Almeida-Thouless crossover temperature and decreases with field, as in canonical spin glasses. In contrast, T_f exhibits a highly unusual field dependence: it monotonously increases for $B \parallel a$ axis, but passes through a maximum at about 1T for $B \parallel c$ axis. We discuss the anomalous field dependence of T_f in context with the Gabay-Toulouse line of the freezing transition for m-vector spin glasses.

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